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ABSTRACT

This report explores environmental alternatives and optimums for a regional center for hearing impairment. The intent is to inform planners, architects, and educators of needs that are hopefully translatable into socially purposeful architecture. The objective is to encourage environmental solutions that reflect the educational concerns and social implications of the programs for the hearing handicapped in Ontario. The report attempts to specify how places and events in a regional center might relate to one another and to identify those elements of physical plans and social organization patterns that create "institutional" building forms and environments. (Author)

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Social Environments for a Regional Centre for the Hearing Handicapped

A pre-architectural investigation
and recommendation
Prepared for
Schools for the Blind and the Deaf Section
by
School Planning and Building Research Section

Architectural Services
of the
School Business Administration Branch
Ontario Department of Education
Toronto 1970

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Introduction

This report explores environmental alternatives and optimums for a regional centre for hearing impairment. Its intent is to inform planner, architect and educator of needs and possibilities which might be translatable into socially purposeful architecture. The objective is to encourage environmental solutions that reflect the educational concerns and social implications of the programs for hearing handicapped persons in Ontario. Both existing programs and those that may evolve in future decades must be kept in mind.

This report implies that architectural innovations of the early third of the century must now be subjected to critical scrutiny. The language of forms characteristic of the "Modern Movement" is perhaps not adequate for the social revolution we are experiencing.

In brief, an awareness of the social impact of environment is initiating a new phase in architecture. A language of design is needed to express human diversity, human action, and human place.

This report is pre-architectural; it does not set out a "language of forms", for this is the province of the designer. It does attempt to specify how places and events in a regional centre might relate to one another. Further, from time to time, the report speculates on whether certain forms might aid in this relation. The report aims to identify those elements of physical plans and social organization patterns that create "institutional" building forms and environments, and recommend solutions.

The study has therefore ranged broadly over a considerable number of issues and presented a series of alternatives and possibilities, the main aim of which has been to stimulate the imagination of those involved in planning similar types of residential schools. Although it is relatively straightforward to raise issues and consider alternatives, it is difficult to define solutions.

In some areas, it has been necessary to distinguish personal opinion from opinions stemming from general consensus held by the educators of the deaf who have aided in the study. In Chapter 7.0, the report recommends empirical research which could be carried out in certain areas of doubt when no clear evidence exists as to adequate decisions.

Key Findings and Recommendations

Investigation has focused on the evaluation of existing and possible environmental programs for the hearing handicapped. The basic objective has been to recommend an optimal environment for a "regional centre for hearing handicapped" which would enhance educational and child-development objectives.

1 Community character: Findings and recommendations

Desirable qualities of existing residential school environments

a) emotional warmth and security of environment

b) physical comfort of environment

c) educational program keyed to long-term needs of hearing handicapped children

Undesirable qualities

a) routinization of daily activities

b) lack of privacy

c) lack of urban contact and neighborhood contact

d) visual monotony of environment

Recommended objectives

a) community and neighborhood accessibility

b) contact with hearing communities

c) individual privacy in residential cottages

d) separate zoning of residences away from main centre buildings

e) greater visual richness and environmental diversity

f) provision for wide range of project and learning spaces and facilities in learning areas:

- visual arts studios
- photographic facilities
- science laboratories
- audio-visual and other resource centres
- television production facilities
- computer terminals

2 Social-environmental program

Social projections affecting hearing handicapped populations

a) deaf community will remain a continuing reality

b) an increase in working skills will be required to ensure useful employment throughout life

c) a higher percentage of the adult deaf will enjoy normal family and social life in coming decades

Recommended social-environmental objectives

a) residential groupings should be integrated by age and sex to reinforce home environment

b) educational environment should encourage individual initiative and out-of-school projects

c) learning areas, particularly studios, should be designed so that they can remain accessible after class hours

d) vocational-educational and general educational environments should make maximum use of various facilities (outlined under 1f above) to develop fullest potential of individual students

3 Environmental design: Site development

The site might be divided into three zones or spines for development

a) high degree of community contact, depending on street character

b) intermediate degree of community and street contact

c) low degree of

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a) high degree of community contact, depending on street character

b) intermediate degree of community and street contact

c) low degree of community and street contact

Facilities to be included in Zone 1 (high level of community contact)

a) comprehensive hearing evaluation centre

b) administrative offices

c) reception area and exhibition gallery for display of work by hearing handicapped persons

d) small neighborhood sundries shop on street, open to centre residences and neighboring residential streets

e) swimming pool, athletic facilities to be shared with neighborhood

f) auditorium — to be shared with neighborhood

g) coffee house and garden (for warm weather), open to passers-by and visitors as well as staff and students

h) bus turnaround or loop for use by neighborhood as mass-transit terminus

i) entrance courts to cottage residences

Facilities to be included in Zone 2 (intermediate level of street and community contact)

a) learning areas

b) classrooms and interior streets

c) studio-laboratories

d) play areas

e) main residential-cottage complex

f) staff houses

Facilities to be included in Zone 3 (low level of contact with street, depending on site)

a) major part of athletic complex

b) playing fields

Suggested Concept
for Regional Centre

Educational
the Environ

c) adventure playground
d) construction playground
e) nature park

4 Proposed residential facilities

cottages for younger children and children with ambulatory handicaps

cottages for children 7 - 12, at some distance from main centre buildings and with access to street

apartments for senior students commuting to classes in hearing high schools (these would be incorporated at a later stage of development)

The proposed centre for the hearing handicapped will have three principal objectives:

1 Provision of special education programs and facilities to enhance personal achievement for hearing handicapped persons within the region of southwestern Ontario.

2 Provision of an evaluation centre and staff to carry out a continuous program of assessing needs and potentials of hearing handicapped persons in London and the surrounding region.

3 Provision of adjunct services and facilities to support the program of the school and evaluation centre. These would include:

- residential facilities for children (ages 5 - 14 during first phase of centre, day students from age 3)
- adult education, counselling, recreation, vocational guidance programs
- recreation facilities for the use of the general community

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Educational Objectives and the Environment

1 The hearing handicapped child enters the residential school at five or six and day school students may enter at age three; he may remain there until after eighteen years of age. The school year lasts from the first of September through the end of June. It is this extended stay throughout the children's formative years that causes the atmosphere of the complex to play a predominant role in their development. It becomes home, school and sometimes church, combined in a single set of buildings and personal relationships. Therefore, the architecture of the buildings and their grounds becomes a pervasive influence which conditions learning.

This social and psychological environment is the aim of the recommendations and suggestions which preface this report. However, studies in recent years show that the most important determinant in the social environment is not architectural design (physical form), it is the school program that is the main generator of social environment, including such relevant factors as which children come to the school, which classrooms they are placed in, and so on.

In this case, the determinant of the social environment is the fact that deaf children are brought together to be educated. Most of their time is spent with each other. The purpose of the school program is to make them functioning and able persons in the hearing world.

2 To warrant the provision of specially trained teachers and the range of technical equipment required for educating the deaf, a minimum of 100-150 students should participate in the project. As more

persons live in urban areas, daily commuting to and from metropolitan schools has become easier. While it is on balance desirable that all students should be day students, in the foreseeable future, many deaf children will continue to be from non-urban areas. Residential facilities are therefore required. The nature of such residences may affect educational objectives. Difficulties that arise in teaching speech and language to hearing handicapped children are not ameliorated by the fact that the children must be brought together to become educated. The focus of the program is the use of speech and vocational training to integrate them into the hearing world. Yet, within the school, sign language tends to dominate student interaction. Thus many educators feel that there should be more exposure to the hearing community.

3 Educators of the deaf are intensely aware of this need for integration. A number of recent policies are altering the segregated nature of deaf education in Ontario. For instance:

- parents are asked to take their children home each weekend where possible
- an increasing number of children within commuting distance of schools for the deaf are being brought back and forth daily
- schools for the deaf are being built directly adjacent to hearing elementary schools and share community facilities such as playgrounds, physical education areas, art and home economics studios, and libraries
- for senior school hard of hearing students, satellite classrooms especially equipped for the deaf are being located in hearing schools. Such rooms are often staffed full-time by a teacher of the deaf and served by psychological and social counsellors from the centre.
- some junior school classes are being held in specially equipped classrooms within hearing schools
- the hearing community and the adult deaf community are being invited to use facilities and programs in the centres for deaf education

In other words, schools for the deaf are becoming centres for specific limited activities which aim to make the children able to function independently in hearing schools and the hearing world.

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Environmental Objectives

1 The regional centre should be thought of as an "open community", made up of individuals and groups brought together to provide and utilize compensatory programs for hearing disabilities that prevent the learning of normal speech and other skills in the hearing community. Within the open community, individuals must find an environment in which they can achieve a wide range of personal needs and goals.

This community must provide a measure of therapy:

- a sanctuary from stresses in the general community
- a place for mastering stresses as preparation for more or less continuous functioning beyond the hearing centre

This community must provide a measure of compensation:

- social contact – richness and variety of friendships and acquaintances
- visual stimulation
- development of oral abilities, academic learning and vocational competence

The general objective is to apply the following principle: Each child must be able to find within this environment a number of graded freedoms and responsibilities, as well as exposure to the normal community and support from associations in the centre.

2 This objective can be expressed in the architectural solution. The site is an open campus whose edges become key areas for inviting the participation of the outside community. Within the site one sees different kinds of buildings, each clearly expressing its function. Classroom buildings, showing their group character,

contrast with the individuality and privacy of residential houses and cottages. Near the edge of the campus, situated close to shopping and street life, there may eventually be apartment dormitories for older students. These students would have attained a degree of competence in speech and emotional maturity which might justify a greater measure of contact with the hearing world.

A range of urban facilities occupy the edges of the campus. A swimming pool, library, public playground, playing fields and parks, perhaps a normal hearing school, could invite community use of the centre and provide greater opportunity for hearing handicapped children to practise oral abilities. Sociologically, one can speak of the importance of "role models" from the surrounding community, for younger children particularly, in encouraging attainment of functional oral abilities.

3 The concept of a regional centre emphasizes the specialized nature of the program and environment. If the current tendency toward increasing integration with other community programs continues, the function of the centre should become confined to educating and counselling hearing handicapped persons.

4 The contemporary urban environment is generally untidy, unpredictable, fluctuating and often uncomfortable. In contrast, the school or institutional environment tends to be orderly, tranquil and comfortable.

It is a general objective of this pre-architectural paper to suggest means by which the centre can be a place where children may learn to cope with difficult or uncomfortable environments – social, physical and educational.

Social participation with the hearing world is the primary challenge faced by most deaf persons. It gives rise among some to paranoiac tendencies, to irrational fears, withdrawal and passivity, as well as a general reluctance to take the initiative on one's own behalf. In a society marked by change and restlessness, this reluctance has permanently limited the life chances of many of the adult deaf.

The proposed centre program could provide a series of "zones" within its campus through which the child could increasingly expose himself to hearing associations and the world beyond the centre. A reception gallery, coffee house, auditorium, milk store, street front areas, athletic facilities, and, from time to time, the dining room, could be places where children could become exposed to hearing people from outside. Easily accessible links to the shopping centre, community recreation centre and Fanshawe College should provide opportunities for the deaf child to experience the urban community.

The physical environment could also be made flexible. Furniture elements in living, dining and learning areas could be movable. Sleep-study areas could include paintable surfaces that would permit the child individual expression. The playgrounds could be laboratories for creative play: painting old cars or abandoned boats and building playhouses.

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Following investigation of deaf education and consideration of the general direction of educational policies, some goals may be set out to evaluate and define design decisions by the architect-designer.

1 The primary consideration with regard to the residential facilities is to provide maximum exposure to nearby hearing communities and at the same time ensure supervision and emotional security.

2 The task of second greatest importance is to provide in the residential facilities opportunities for:

- privacy for each individual
- intimacy within the residential group
- a rich, orderly and changing visual environment

that can provide stimulus to compensate for hearing impairment. This principle is implemented in the various parts of the report on internal residential environment.

3 Classroom and school design should be based on analysis of learning processes.

4 The building complex should be characterized by a variety of social environments, ranging from formal to intimate, from secluded and private to public and challenging. The intent is that a child be upgraded toward normal hearing environments as quickly as his development of communication skills will allow.

A variety of different combinations should be available in living and learning situations:

The Learning Environment and Teaching Program

Living

- residential houses immediately adjacent to school
- cottages somewhat removed from school and adjacent to surrounding community
- apartments for senior students

Learning

- classroom instruction
- individual classroom study
- library and audio-visual resource centres
- outside projects and study

The learning complex could be a focal point for encouraging initiative in changing one's environment. Perhaps the most fundamental philosophical objective behind teaching is to impart the mental flexibility needed to confront new situations in life. Reading, writing, speaking are ways of learning to manage in life.

Deaf children face excessive difficulties in mastering verbal communication. Learning this communication is of central importance in developing abilities to cope with life. However, other communication skills may be more accessible to hearing handicapped children and facilities for developing these skills should be provided. The visual media, for example, should not be merely auxiliary to speech and reading.

Photography
Each child should be provided with inexpensive snapshot cameras for personal use. Free film and perhaps even free cameras could be obtained from manufacturers.

Motion Pictures
Inexpensive equipment is available. On the "home movie" level, expense compares with snapshots.

Television
The equipment required is expensive. A system has already been installed at Milton for transmission of prepared instructional programs. The equipment could also be used for closed-circuit broadcasting of student-prepared, student-directed shows.

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Computer Terminals
This model of instruction is relatively expensive, but of immense importance in giving children everyday familiarity with the most important technological tool available to society in the next few decades.

These facilities should be accessible after class hours.

Summary of Social Findings and Recommendations

In some ways, social environment in these schools is superior to much of the general urban environment. It is difficult to feel isolated or alone in these schools. There is a fairly high degree of physical comfort, and the irritations of traffic congestion, air pollution and other pervasive environmental problems are little in evidence in these settings.

It is important to realize that job stability and physical comfort are attractive features to staff, and important elements in recruiting and retaining able persons for the centre. On the other hand, interviews have also indicated that younger staff persons are interested in being closer to urban and university communities. The conclusion is that both social and physical amenities within the centre and proximity to urban centres and opportunities are necessary to attract and maintain the interest of prospective staff.

For the children, a variety of levels of contact with the surrounding community is necessary, as has been indicated in the introduction. The security of the school environment should be complemented by opportunities for exposure to surrounding neighborhoods.

Existing Schools

Daily routines and architectural organization may be associated with typical social problems. In residences no great provision for individual privacy has been made. Fifteen children occupy a single bedroom in which there is little indication of any provision for a private area for each child. There is no individual storage space for toys in the playrooms. The practice of lining up and moving as regimented groups in daily activities further reinforces the feeling of group action, rather than individual choice and freedom. There are perhaps economic limitations and administrative needs which do not allow for as much individual attention as might be possible in a family home.

One may compare descriptions of group living in the school with attitudes and opinions expressed in interviews by counsellors and other members of the staff. Asked to describe typical social and psychological problems of deaf children, teachers used a number of terms and phrases which reflected the group character of life at the school. Deaf children were described as "passive," "imitative," "unintellectual," "lacking in initiative." A number of people used the same phrases: "Everything is done for them"; "They have no responsibilities to look after". There was general agreement that children lack normal opportunities for diverse play and work experiences at the school. There was also agreement that many children could not be interested in reading or other quiet work. Senior school students, one respondent felt, were too preoccupied with athletics.

Some association may exist between lack of privacy and lack of interest in individual activity, especially intellectual activity. Provision for privacy and a family-type social grouping would promote individual growth and work and play responsibilities as the child matures.

The School as a Sub-culture

Any school is a socializing institution. It teaches far more than skills; it engenders social patterns, attitudes, friendships, and special dialects. At all levels, the school is split by cliques and rivalries within every area of learning and play. These patterns arise spon-

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The composite social character of each school for the deaf has its own pattern, distinct from each other and from regular schools. For example, although the Milton School was opened only a few years ago, interviews indicated that teachers who had taught both in Milton and in Belleville saw significant distinctions between them. Each school has its distinct culture of ideas, values and social patterns. Within a few years, the new centre at London can also be expected to give rise to a special set of customs, a new "sub-culture".

Increase in Leisure

For society in general, a long-term decrease in work hours and in the proportion of adult life spent in work is expected. This increase in leisure does not mean that personal problems will decrease. Probably emotional problems will increase in this new "leisure vacuum". For the deaf, these problems may become more acute than at present.

Placing hearing handicapped children in environments that provide them with secure emotional attachments and supportive community life styles may enhance their capacity to use leisure fruitfully. At the same time, there should be an increase in their awareness and ability to cope with the stresses they will encounter on leaving school.

The Adult Deaf Community
In the contemporary world, the adult deaf community is a small minority community. It has its own institutions – churches, social clubs, insurance and banking societies and, of course, schools. While the deaf do not live together, they come together for social events with other deaf people almost exclusively. There is an International Deaf Olympics held every four years, similar to the regular Olympics.

Why do the deaf isolate themselves to this extent from the hearing majority? The reasons are complex but all can be traced to the fact that a great majority of the deaf never learn to speak well nor become fluent at speech reading. Communication among the adult deaf is mainly manual, using signs or spelling.

As a minority in society, their position may be viewed in political terms – i.e., the question of how power over situations special to deaf persons is exercised. Generally speaking, as with other minorities, the affairs of the deaf are subject to priorities laid down by the hearing majority in the society of which they are a part.

The theory popularly accepted by society is that minorities do not exist as separate communities; despite considerable evidence to the contrary. Yet the deaf, like black persons or French-Canadians or persons of Ukrainian descent, identify themselves as persons with common problems and interests. They find it desirable to seek among similarly handicapped the basis for a community. Even though average verbal achievement may increase a desire for separate institutions among the deaf will not necessarily decrease, although the proportion of the deaf population dependent upon them may decrease.

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Relation Between the Multiply Handicapped and "Normal" Hearing Handicapped Children

1 An increasing number of multiply handicapped children are now being accepted in the school programs. Whereas many United States programs for the hearing handicapped will not accept children with I.Q.s below 80, or who are not ambulatory, or who are emotionally disturbed, Ontario programs accept these responsibilities where feasible. The number of multiply handicapped children will continue to grow in the foreseeable future. An immediate cause is the outbreak of maternal rubella (German measles during pregnancy) in the mid-1960's which brought about a sharp rise in the number of deaf multiply handicapped children. Also, at present, we are able to save infants who would have died in earlier decades and are now able to educate or train them.

2 Another major change in the residential population of schools for the deaf will be brought about by the gradual removal of hard-of-hearing children. These children are defined by the ability to perceive human speech to the degree that, with aids, they can learn speech through hearing and special training. Loss of hearing for these children ranges from 20 percent to 50 percent. Since oral skills are greater among these children, they are better able to be integrated with special help in ordinary schools. A slightly greater percentage of them tend to be better academic students in the residential schools. Interviews indicate that counsellors rely on them as go-betweens with totally deaf children. With the establishment of divisional boards of education, the provision of day classes for the hard of hearing in each area has become more practical, so that eventually fewer will remain in residential programs.

3 The net result is that while a growing number of low-achieving multiply handicapped children will come into the residential schools, an increasing number of relatively high-achieving youngsters will be placed in local day classes attached to normal elementary schools.

This trend has important implications for the environment and facilities of the proposed regional centre.

In the first place, residential students (aged 6 to 12 or 13) will represent on the average a lower potential for achievement by the standards of the hearing community. This factor underscores the need for contact with the hearing community on a day-to-day basis. We must recognize that the average student's basic capacities may not make this contact easy. Although an environment open to the outside community may make this contact richer in potential than in existing schools, the expected change in the population character of the residential school will have the counter-effect of separating students from the community.

Movement; Touch; Sight

Compensating for lack of hearing means moving, seeing and touching. Children with hearing handicaps seem to move about more than normal children. In class they are easily distracted by visual events outside the teaching situation. Small changes in the visual environment will arouse their curiousity. A new person in the environment must be smiled at, touched, escorted, sensory communication takes the place of speech and sound.

The feeling of warmth and security in the schools comes partly from this visual communicativeness of the children.

Western culture discourages touching among persons in non-intimate situations. These children do not adjust easily to these touching taboos. After puberty, the desire for communication through touch probably promotes the onset of sexual interests, both homosexual and heterosexual.

In general, these students are prone to become better athletes than scholars. Given the difficulties of learning the symbolic vocabulary of books and argument vs. the concrete experiences of the playground, the ball field and swimming pool are more accessible and satisfying.

Sign Language

Sign language and the use of gestures are part of the social world of children with hearing disabilities. Sign language should not be neglected as a means of communication. While primary emphasis must be given to developing oral abilities, sign language may at some point become as rich and intricate as spoken language. At Gallaudet College, experts have been working for over a hundred years on developing a literary culture using manual language. Although this development has received wide acceptance and sign language is recognized as a special medium for those in the deaf community, it cannot replace oral and printed language skills.

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Speech and Language Development

Speech and speech comprehension for the deaf depend, on the one hand, on the kind of education they receive, and, on the other, on basic intelligence and individual ability. Rapid gains in teaching speech have been made in recent years. However, some intelligent deaf persons appear to have no talent for lip or speech reading and therefore never communicate easily with the hearing world, except in writing.

The issue of language development must be carefully distinguished from that of speech and speech reading. While a person may never become a good speaker or lip reader, his ability to use written language – in terms of vocabulary, syntax, and so on – may compare favorably with a hearing person's. There are some deaf persons who never attain adequacy in either speech or language.

Language and Intellect

Another issue is that of the relation between language and basic intellectual capacities. Experts argue as to whether language, the use of a sequential pattern of sounds or sound-related symbols, is necessary for intellectual development. The "antiquated" view is that language and intellect are integral to one another: one cannot exist without the other. A "radical" interpretation, advocated by some young linguists and psychologists, is that language is only one form of intellectual discourse possible for the human mind. The popular exponent of the possibility of other kinds of communication is Marshall McLuhan, who argues that intelligence may be generated from images and pictures, as well as sequences of sounds and concepts. Hans G. Furth's book **Thinking Without Language: Psychological Implications of Deafness** (New York

Free Press, 1966) summarizes arguments on this subject and presents experimental findings showing that intelligence does not depend on language.

General Developmental Characteristics

In a recent symposium on educating the deaf held by the American Council for Exceptional Children, Dr. Janet B. Hardy summarized eight general conditions considered primary in educating the deaf:[1]

1 Deaf children almost invariably have other problems.

2 Communication problems in young children are not static. The difficulties frequently change as the child changes with growth and development.

3 Remediation, both medical and educational, must be directed toward the needs of the "whole" child, not just to his communication problem.

4 Remediation must begin early; therefore, the diagnosis must be made early.

5 The pattern, or plan, for remediation must be tailored to fit the individual child, and will require to be changed as he changes.

6 Knowing the etiology can be helpful in terms of indicating the kinds of other problems a given child may have.

7 Knowledge as to etiology of communication defects is important to all of us, as the ultimate goal should be prevention – of the primary defect and its secondary components.

8 An immediate challenge is the need to plan for the identification and education of the many thousand rubella children left in the wake of the 1963/64 and 1965 epidemic.

Psychological Problems of Deafness

Extensive research has been done on psychosocial problems among deaf persons, using the deaf population of New York State. Dr. John D. Rainer one of the research directors of the ten-year-old project, has reported findings in some detail.[2] Rather than extracting the article, some of it has been transcribed in the following section, since the findings are of immediate interest to this investigation. Headings have been added to aid in locating topics of specific interest.

1 Psychosexual Development

Less than twenty percent of adult deaf persons interviewed ". . . had the experience of dating other than in group situations. More than one-half had no experiences which could be described as dates at all and a full ten percent had no friendly relationships whatever with the opposite sex throughout the school years.

"Our interviews indicated little actual sexual experience during the school years, but with homosexual activity more common than heterosexual behaviour among those males who did admit some sexual experience during this phase of their life."

2 Vocational and Educational Development

The deaf have improved in educational achievement at about the same rate as the rest of the population.

- 4 percent have high school graduation plus other training
- 16 percent drop out of high school before graduating
- 90 percent work in some form of manual labour, half in the skilled category.

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In the same study, Dr. Rainer stated:

"Importantly, there was no relationship found between the classification as skilled or unskilled worker and completion of grade school or school for the deaf. Significantly, 30 percent of those interviewed had had no vocational plans at all at the time they left school and only 40 percent felt that their school training had been helpful in obtaining employment. These figures were very much in line with the nationwide figures compiled at Gallaudet College (in Washington, D.C., specializing in college education for deaf persons), and to our mind they strongly indicated the need for expanded programs of vocational exploration, training, guidance and individual counselling during the school years.

3 Family Relationships

". . . We found that in families with hearing parents, by far the largest number, almost one quarter of our deaf subjects felt they had been overprotected by their parents while another sizable group felt they had been shunned by both their mother and their father. Those deaf people who were considered to have emotional difficulties were more often among these two groups than those who received equal treatment with their siblings."

[1]Dr. Janet B. Hardy: "The Whole Child: A Plea for a Global Approach to a Child with Auditory Problems" in *Education of the Deaf: The Challenge and the Charge,* U.S. Department of Health Education and Welfare, Government Printing Office, Washington, D.C. (1967), P. 32.

[2]John D. Rainer:"Mental Health and Education of the Deaf", *op.cit.*

"In the very young (hearing handicapped) child rejection, abandonment, and loneliness may cause extreme anxiety and withdrawal. Later on, and observable into the school years, the lack of outlets for restlessness and impulsive needs may lead to destructive behaviour, temper tantrums and further alienation of the adults around him. Finally, perhaps most important in most cases, the free-and-easy process of learning how to relate to parents with all of its difficulties appears to be necessary in order to develop a social sense, a feeling for others, as well as a sense of self. Severe deficiencies may well result from isolation at home and later in school."

4 Conscience

"Implicit in this process is also the development of conscience, not only a theoretical knowledge of right and wrong, but of the inner voice very often derived in the hearing child from the outer voice of his parent, or of his teacher. *No amount of reasoning, discussion or explanation conveyed through the unheard movement of lips or fingers or pencil on paper can really take the place of the direct sound of the human voice in conveying feelings or admonitions. As Freud put it, the conscience wears an auditory lobe.* This experience has been verified over and over again in talking with parents and teachers who become frustrated themselves and who wonder about proper forms of discipline.

"An interesting contribution in this respect is the observation by a Japanese psychologist, Nakamura, concerning the role of myth, fairy tale, and folklore in developing conscience and a sense of human values, in the last analysis a sense of being part of the human race with its total body of traditions and controls. Much of this sphere is inaccessible to many deaf children.

5 Abstraction

"Problems of abstraction, of course, are also involved in conscience formation and impulse control. As someone said, to characterize equally as "bad" both murder and nailbiting substitutes a word for the richness of human moral judgment.

"The role of speech in the early development of the ability to abstract and the ability to form relationships with other individuals was pointed out by Spitz, who found that the acquisition of speech, usually in the second year of life, marks the beginning of mental operations of an unlimited degree of complexity and places a host of new defence mechanisms at the service of the ego. Without these particular defence mechanisms there may ensue trouble in impulse control which may snowball as time goes on. Now while Spitz referred in this analysis to speech, there is little doubt that in fact these principles apply to communication and language, however they may be mediated.

6 Self-Control

"This process does not end with the school years, however. Acting out in the psychoanalytic sense occurs under certain specific conditions of concreteness, impulsivity, and primitive modes of energy discharge. As described by Lesser, increased cognitive capacities during adolescence permit the teenager to revise and reintegrate his childhood problems, even if there were early defects in control. *These capacities may not be equally available to the deaf.*

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"Correlated with the problems of conscience are difficulties for the deaf child in handling power and strength, for the deaf child has the converse of the parents' problem. How is he to get his wishes across to the hearing world? How is he to make his mark upon them?

7 Self-Image

"Finally, all of these considerations bear upon *the self-image of the deaf youngster and adolescent,* an image to which we cannot close our eyes no matter how disconcerting it is. Certainly it is hard for the educator, the parent, the doctor, having gained the confidence of the deaf child, to hear the child say, "We deaf people are stupid. It is unfair to be deaf. You will never know how we suffer." The deaf person as he grows older tends to deny these problems, at least most of the time, and it is tremendously inviting to go along with the denial, but *the degraded self-image is a fact, and its amelioration is a primary goal of any educational endeavour.*

"One must, of course, not blame either the parents or the teachers of the deaf for the shortcomings that still exist. As the Advisory Committee's report states, the need for better understanding of goals and recommendations in no way diminishes the dedication and sincerity of those who have up to now been faced with these serious problems. And the teachers and parents of deaf children operate within a society itself still unknowing and often prejudiced, one which still offers too few opportunities to the deaf. But if the older deaf child already shows the results of some of the early developmental defects just now briefly described, there would still seem to be remedial mea-

sures that can be effective. Prerequisite to these, I would suggest, is better communication between parents, teachers, and psychological staff. Parental aspirations, especially as the deaf child grows older, seem to be either too high or too low, moving from unrealistically optimistic goals to frustration and complete pessimism. In group discussions which we have started with parents at a school for the deaf we have found that the parents of younger children in the first few grades of school are concerned mainly with the problems at home, particularly those of discipline and relationship with other siblings. In the older age groups, however, the parents are now involved in their sons' or daughters' preparation for life and their lack of understanding or communion both with their children themselves and with the schools regarding these problems.

8 ". . . Education for group living, and graded experience in social role mutuality, and family and peer relationships should be part and parcel of the school program. These may be supplemented by proper facilities for individual trouble-shooting, attention to difficult psychiatric problems and continual interaction with parents and teachers."

1 Community access and use of the centre's campus is of primary interest to this investigation. Social objectives for site development can be based upon this central intention.

The prime objective is to make the centre campus usable for the community and the community accessible to the campus. The visual character of the campus, the activities situated upon boundaries shared with the community, and pedestrian linkages are important means of encouraging and facilitating this interaction.

For students in residence, one objective is to provide the advantages of both the campus and of the suburban area. Thus the residences might be situated on the campus boundary directly opposite suburban homes and maintain an appearance in scale with that of the neighborhood.

Since the car is the principal means of access to the facilities of the centre for the majority of persons in the surrounding region, parking close to major entrances to the campus must be provided. Deafness makes it imperative to keep principal pedestrian paths and traffic roads separate. The solution at the Milton school places traffic in loops on the periphery and pedestrian walks at the centre of the complex; this principle may prove useful in a design for the new centre.

2 Thus specific site planning must include convenient and safe pedestrian access to nearby shopping areas. The edge of the site should allow for interpenetration of present and potential community uses. For this purpose, the following facilities might be provided:

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Site Concept and Objectives

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- library resource centre
- public gardens
- moderate-income housing development (perhaps for staff)
- public playgrounds
- swimming pool
- normal-hearing school

Visual character should be in harmony with the environmental character of the surrounding neighborhood. It might reinforce street sequences by providing local landmarks in scale with the setting.

Exterior elevation and landscaping should be of the same general character as that of surrounding areas, while discreetly expressing the character of the school and its parts.

3 The site might be divided into three zones or spines for development:

- high degree of community and street contact
- intermediate degree of community and street contact
- low degree of community and street contact

Facilities to be included in Zone 1 (in this zone of high level of community contact, facilities would encourage interpenetration of centre social life with community social life):

- comprehensive hearing-evaluation centre
- administrative offices
- reception area and exhibition gallery for display of work by hearing handicapped persons

- small neighborhood sundries shop on street, open to centre residences and neighboring residential streets
- auditorium, to be shared with neighborhood
- swimming pool and other athletic facilities, to be shared with neighborhood
- coffee house and garden (for warm weather), open to passersby and visitors, as well as staff and students
- bus loop for use by neighborhood as mass-transit terminus
- entrance courts to cottage residences

Facilities to be included in Zone 2 (intermediate level of street contact):

- learning areas
- classrooms and interior streets
- studio-laboratories
- play areas
- main residential-cottage complex
- staff houses

Facilities to be included in Zone 3 (low level of contact with street):

- major part of athletic complex, readily accessible to parking
- playing fields
- adventure playground
- construction playground
- nature park

4 Site Concept: Application to a Site in London, Ontario.

This site is about 60 acres. The major building complex and its auxiliary functions should cover something like 10 to 15 acres. This complex might be centred on the northern boundary of the site, on the right-of-way to be extended from Cheapside Street to the community centre.

This position would also minimize walking time to the Northland Shopping Centre, about one-quarter mile north on Highbury Street. A planned subdivision presently exists in the adjacent neighborhood north of the site.

Near the corner of Highbury and Cheapside principal administrative offices and related facilities could be clustered in a complex whose heart would be the auditorium and library resource centre. The frontage, as detailed in a later section, could emphasize group life and maintain the scale of a high-quality shopping district. Proceeding along Cheapside past the dining and auditorium facilities, one would see residential cottages clustered in groups of four. These will appear quite unlike the administrative complex, matching the suburban scale of the nearby subdivision. Their placement should be convenient to the projected community recreation centre.

In the middle of the site (Zones 2 and 3), principal school and learning areas would be situated and oriented to the interior. Interior open spaces might include a construction playground, adventure playground, and park and ponds for nature study. Staff houses could be situated off Cheapside Street and screened by a cluster of trees.

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Pedestrian links and athletic fields might be shared with Fanshawe College, to the southeast of the main centre, and the Provincial Hospital, to the south of the site.

The centre's indoor athletic fields could be placed in a diagonal series running from Highbury back into the interior of the site. The swimming pool might be close to a bus stop on Highbury, making it accessible to parking and bus traffic. Other gymnasium facilities could be adjacent to playing fields in the southern part of the site.

Notes on Communication and Materials

The centre environment must reflect an awareness of the visual and tactile sensitivity of hearing handicapped persons.

1 Pedestrian Ways
A pedestrian movement system, connecting site entry, exterior space, and interior spaces should be defined and described as a separate design problem. It must take into account the fact that the centre will be visited by thousands of persons each year who are new to its environment. Therefore, there must be a clearly defined system of landmarks and keying devices by which people can make their way about unassisted. Such elements as signs and graphic symbols, clusters of vegetation and landscape furniture, specifically designed alcoves, wall configurations and murals, and graphic patterns in ceiling and floor texture should be considered.

Prime importance must be given to providing precise visual cues concerning appropriate behaviour in any part of the site and complex. Areas open to the public

should be easily accessible from the public way through the complex. Yet, if they are areas specific to a non-public activity or group of persons, this difference should be underscored by visual cues – through explicit signs ("Noise in the library, please") or implicit indications (intimate lighting, carpeting)

2 Interior Circulation
Within the enclosed area of the complex, there are areas where movement and change between special functions – eating, learning, studying – take place. Hallways, corridors, stairwells are the traditional means used to connect rooms. In this case, the recommendation is that movement space be used for certain changing events: project exhibitions, social encounters, relaxing, solitude and watching other people.

As interior streets or galleries, movement spaces might thus take on a major social role. They would present a kaleidoscope of visual information, both entertaining and useful. Small openings would be placed at appropriate levels for younger children, enabling them to observe their surroundings and each other. Mirrors set within the walls and in the floor and ceiling would provide new visual dimensions. Television screens and audio-visual screens would project short sequences of news or information or educational films. Portions of the wall could be galleries for students' work: drawings, paintings, photographs. Students could show their films to each other in special display alcoves along the interior street. These alcoves would also serve as changing visual-display casements (e.g. picture displays on art history, specimen displays such as aquariums).

Other areas could become places in which to stop for a moment to carry on a conversation or to think for a time before being involved in the next group activity.

There should be a studied attempt to avoid long vistas of blank, monotonous walls and floors. Rather, the objective should be to provide opportunities for unexpected meetings, using naturally required turnings and confrontations to facilitate social spontaneity.

Transition areas are of great importance. Entrances, exterior to interior, should give clear indication as to appropriate behaviour (quiet conversation, address the receptionist, proceed along this corridor, etc.).

The entrance should show that the centre is intimately scaled and warm in atmosphere, and should not be intimidating or showy.

The pedestrian system should indicate the specific destination to which the various entrances give access:

- evaluation and public reception area
- administration area
- junior school area
- health services area
- residential complexes

3 Floor System (Surfaces)
A general system should be adopted in terms of finish, colour, and texture.

In residential areas there should be a clear distinction between different kinds of territories within and outside the building: personal, community, public, free.

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In school and centre areas, the different functional areas of classrooms should be clearly defined. With regard to movement areas, the interior street system should have stopping places (alcoves, etc.) denoted by floor system.

Rough floor textures should be used in areas where mud and water are likely to accumulate. Classrooms should be carpeted.

Exterior Visual Elevation Systems

The elevation system as a visual element should indicate to persons outside the school the functions of each of the buildings. Beyond sheltering and functional purposes, therefore, the development of a vocabulary of forms is a prime opportunity for underscoring diversity and openness of the whole site development.

1 Learning Complex
This part of the complex should reflect a diversity of learning and social experiences unique in the city and region. Some symbolic indication of internal systems might mean that a highly plastic and imaginative set of forms could be generated from structure. This part of the complex should catch the eye of the passerby and mark the building as a school. As the central focus of the complex, this building could achieve a restrained expression of its organization.

Main administrative functions and reception areas included in this complex should be unmistakably indicated in the organization of the visual system, so that they are easy to find.

This centre and its buildings are meant to attract people, rather than overpower them, thus causing them to shy away from contact. Therefore, the architecture should aim to incorporate the following qualities:

- openness in appearance, rather than a "closed-off" look
- lightness, rather than brooding seriousness
- playfulness, rather than rigid and systematic visual repetition of elements
- asymmetry, rather than symmetry
- diversity, rather than constancy
- liveliness, rather than blandness

2 Visual Effect of Complex
From outside the centre, the building's personality, and by implication the personality of the community inside it, may be read from the windows and other interruptions to the elevation. If a single element is used in a constant and unending series, the building appears as a single-minded monolith, an institution. Think of the typical elevations of hospitals. If there is no orderliness to the elevation, or if it is brutish and forbidding, the building is seen as irregular and socially confused within. The typical reaction becomes apathy or hostility.

The building's internal life should be indicated (but not exposed) in the street elevation. Thus, windows could reveal movement and colour and show evidence of openness, security and opportunity. They might pose a constant invitation to participate in the community inside the building.

3 Windows are Social Eyes
Without windows, the building becomes an object without personality, socially featureless. A windowless building is a building whose inside is divorced from its outside. It cannot participate in a wider community and its internal micro-community is closed upon itself. Windows serve as symbols of communication between the outside and the inside. They conduct light and social messages. Deaf children have an acute visual sensitivity and windows must take the place of ears.

- diversity, rather than constancy
- liveliness, rather than blandness

2 Visual Effect of Complex

From outside the centre, the building's personality, and by implication the personality of the community inside it, may be read from the windows and other interruptions to the elevation. If a single element is used in a constant and unending series, the building appears as a single-minded monolith, an institution. Think of the typical elevations of hospitals. If there is no orderliness to the elevation, or if it is brutish and forbidding, the building is seen as irregular and socially confused within. The typical reaction becomes apathy or hostility.

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In the centre, the architect might use windows to allow for vicarious participation in the life of the surrounding streets. For deaf children, windows at different heights within the complex could be observation posts from which the community can be surveyed. Their placement should provide unexpected confrontations with people on the street. (Paul Rudolph's Art and Architecture Building at Yale University has visual openings to the street. Rae Affleck's Place Bonaventure, Montreal, closes itself to the Streets.)

Within the building, manipulation of levels and wall barriers can provide for unexpected viewpoints through the structure. These children, being visually acute, move about constantly to better satisfy their curiosity. The desire to see what is happening can be responded to in the development of viewing stations and windows.

A short list might suggest some appropriate types of window and viewpoint placements.

a) A window from floor to ceiling directly on the sidewalk, so that the passerby and the child are within the same street space and divided only by the glazing

b) A window positioned at a second or third storey height so that the low-built area around the centre can be seen in all directions

c) Windows between rooms within the complex allow some knowledge of what occurs between spaces

d) Classroom windows could give out onto non-distracting but visually interesting landscapes. (Every classroom should have windows, except perhaps audio-visual viewing rooms.)

Land Forms and Landscape

4 Space Articulation
Certain features of the internal spatial organization might be opportunities for special spaces and visual effects. Many of the activities at the centre (e.g., entering the complex, graduating, carrying on student government, informal meetings in the interior streets and alcoves, etc.) have an element of social symbolism and this factor might be reflected in architectural distinctiveness.

Development and design of outside areas on the campus are second in importance only to placement and design of the buildings themselves. Play areas, athletic facilities, pedestrian and vehicular paths, places for rest and reflection require careful interrelating. Their use requires specific programs in each case. The general objective is to make outside areas of the centre's campus active, positive clusters specifically designed to support their various activities.

There should be constant consideration of how outside areas can become means of bringing surrounding neighborhood groups into the campus. Several adjacent institutions would have the opportunity of sharing facilities with the centre. Therefore, pedestrian routes should promote access to the centre from the different institutions.

1 Variety in Landscape
If the site is flat, variations in topography might be inexpensively constructed by using bulldozers and natural drainage patterns. It is socially desirable to construct variety into the landscape, in kinds of planting (formal to woodland), slopes, ponds and streams, and play-construction areas. The designer should be specifically discouraged from placing primary emphasis on lawns, floral exhibitions and other show elements. The emphasis must be on usable, interesting, lively outside areas. Many of the heavy-use areas may be paved in varying textures. The use of tanbark, gravel and other intermediate-intensity ground textures is recommended. Much of the planting can be done with self-maintaining ground cover. There will be a number of specific outside-project areas whose relationship to learning and residential complexes will have to be studied.

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2 Construction Playground
The construction playground is an area of perhaps an acre or more, equipped with a wide variety of simple building elements: bricks, concrete blocks, scrap lumber of many dimensions, bolts, pipe, small concrete viaducts. There should be mounds or abrupt rises in the edge of the site. A number of mature trees would be desirable. A quantity of gravel, river rocks, water and mud should be readily available. The tools, to be checked out by the students from supervisory sheds near the playground, should be simple: hammer, nails, straight saws, shovels and wheelbarrows. Storage areas might be located in athletic buildings.

Use of this playground demands planning, initiative, skill, co-operation and work from the children. Socially it suggests that children should manipulate their own situation to create a pirate ship or clubhouse, rather than be given pre-constructed models.

3 Adventure Playground
The adventure playground includes many of the play elements associated with a more traditional idea of the playground: swings, teeter-totter, slides, monkey bars, and so on. Each of these elements, however, is related to a sequence of play activity and play spaces. This playground should be more than a series of pieces of equipment lined up in rows. Instead, it could be a diverse landscape of paths, tunnels, climbs and swings. It could include hard surfaces (asphalt, concrete), intermediate surfaces (gravel, clay), and soft surfaces (wood chips, sand, grass). Each of the surfaces is suitable for a different type of play activity.

The social objective of the adventure playground is to provide a vigorous play experience which does not

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become boring to the children. To do this, the swings, teeter-totters, and other elements must become part of a path of movement which a group of children may use for running games, such as tag, hide-and-seek and leap-frog. The play elements can then become part of a social interaction. This kind of design would reinforce this aspect of games, which is already in evidence in playgrounds where the use of swings becomes social interaction. The nature of the play elements would be intensified and deepened.

Two or more freestanding brick walls, with corners, openings or other eccentricities, should be included in the design.

A trestle or lattice of wood beams, bridging rises in topography, would provide another focus for play.

4 Nature Park (south part of site)
This area should be developed as a common resource shared by Fanshawe College, the Provincial Hospital, the centre and the City of London. Its ideal use would be as a nature park – a park of woodland and ponds, rather than an urban garden. Such an area might be useful for biology curricula in the various schools.

Design Objectives

For purposes of discussion, the following educational objectives are suggested as a basis for environmental planning decisions in the learning complex.

1 The educational environment should facilitate development of initiative and self-inspired courses of action on the part of students.

2 The environment should aid in the development of each student's capacities to communicate, both orally and through other media.

Two social objectives may be stated as integral parts of the educational program.

3 The environment should facilitate increasing independence from the teacher on the part of students. As a child's self-understanding and capacity to communicate increases, he should be able to become less dependent on the teacher.

4 The environment should facilitate development of ability to work in groups, as well as alone. The project team should become a means of organizing learning experiences, with the teacher serving as a guide.

Thus, design of the various parts of the learning complex should accommodate the following social units:

- individual student
- groups of 6-8 students (oral instruction)
- groups of 2-6 students (team projects)
- individual student (or two students) working with one teacher (special drill, remedial instruction, oral instruction)
- groups of 6-12 in round-table discussion

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Learning Processes

1 The range of existing and possible learning spaces in this complex may be divided into four:

a) teacher-to-group instruction: speech and reading skills and games, etc.

b) teacher-to-individual-student instruction: speech, individual drill, etc.

c) student-with-student projects and work groups

d) single student work areas
- quiet study and paper work
- active projects requiring construction and building space.

The following elements are used in classrooms at Milton:

a) a semi-circle seating arrangement for oral instruction

b) a carpeted area of about 100 square feet with a loop hearing aid, used in rhythm practice and movement games

c) individual study and work areas, using tables for private study or with a teaching assistant

d) desks with mirrors for use in oral practice.

2 Classes are organized into groups of eight students and a teacher. Teachers are specially trained and their methods experimentally validated for instruction of deaf children.

Learning and Resource Areas

1 In future decades, the enrichment of learning experiences now current in normal schools will overflow into deaf education. An increase in verbal achievement for deaf children will bring about a development of their mathematics and science skills. The use of laboratories and studios, both outside and inside, will become possible. An indication of this developing tendency is found at Milton at present, where several classrooms in the senior school feature "total environments" filled with animals, visual materials and experiments.

2 A chief determinant of the building system in the teaching areas is the desirability of flexibility in space size and character. A general analogy might be made with a warehouse whose interior permits variations in number of floors and sizes of defined areas.

A combination of studio-laboratory and flexible open space affords some ideas about space adaptability. Certain internal limits may be defined from a careful consideration of elements in the teaching process.

Design should specify the relative position of areas of different use by establishing a spatial distribution ranging from: (a) organized to unorganized, (b) quiet to noisy, and (c) individual to group activity.

3 A type of area useful for consideration here is a typical television production studio. Its space boundary is fluid and fixed by equipment and stage backdrops which can be moved at will, usually on wheels. Overhead there is a power grid, a matrix of iron bars and catwalks allowing lighting and other technical equipment to be dropped within the production space at will. Floor and ceiling heights may be varied.

For children there are clear limitations as to the workability of such a space in a school complex. The safety of the children must be insured, requiring means of locking off areas of potential danger. Noise can be suppressed by carpeting or by wall barriers. Adult supervision of the entire working space of the studio should be conducted from platforms.

4 Bertram Berenson, a research architect, has summarized some general design requirements for teaching areas in special schools:[1]

a) "All visual parameters (characteristics) of the moveable elements should be easily and rapidly changed. This will allow the visual environment to become more complex over a period of time and in relationship to the child's capability of coping with it.

b) "Flexibility should be both internal and external: rooms with static limits should be changeable internally – subdivided, made simpler or more complex. Rooms adjacent or in close proximity to one another could be coupled or reorganized into one larger space.

c) "The addition of teaching machines, visual and auditory aids, data collection and distribution devices as well as immediate viewing equipment such as two-way mirrors should be included as an integral part of the architectural design.

d) "Flexible furniture and equipment such as multi-use desks and chairs, display boards and storage units should reflect both curriculum needs and the various spaces in which they might be used."

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5 Spatial organization of the learning complex should also consider other needs.

Each speech classroom should have equal access to studio, laboratory, library areas.

If a classroom faces south, it will need sun screens, which might be lattices of wood or concrete, to cover small outdoor terraces beside each classroom.

Areas used for oral instruction of individuals or groups – the semi-circle and carpeted loop area – must be well insulated from outside sound sources. Most hearing handicapped children who wear hearing aids can hear some of the sounds of speech. These sounds are the only direct experience of speech that the child will have and thus are of great importance in teaching speech and lip-reading.

A library resource centre shared by all classrooms should be located somewhere in the centre of the learning complex.

In summary, each child may conceivably be involved in five or six separate kinds of learning activities during the day, each with its own area requirements

[1]Bertram Berenson, "Research Conference on an Architectural-Educational Investigation of Education and Training Facilities for Exceptional Children" (Sept. 9, 10, 1965) Mimeographed.

- individual study at desks
- group oral training
- individual tutoring area
- group discussion in library resource area
- work benches (with appropriate storage) for manual and science projects
- rhythm and art rooms

As the utilization of technical aids increases in deaf education, two kinds of development may be expected to take place. One, the child will have available many more possibilities for individual initiative. There may be less emphasis on learning through purely verbal or reading skills. New forms of instruction will use images, in the form of drawings, photographs, films, television, wall paintings, etc. These will be paired with and will incorporate printed forms of communication.

Second, new types of group learning may be expected to develop. There will be the possibility of staging plays in groups, using gesture and pantomime, as well as speech. Modern dance methods might be introduced into deaf education.

1 Television and the Computer

The use of television, both receivers and cameras, and computer keyboards may eventually increase in deaf education. The Milton school is currently installing a television network. In a new centre, technical provision for the cables could be made, for instance, in floor channels 6 to 12 inches deep, which can be opened by removing plates from the floor or by dropping them from overhead conduits.

The computer could eventually be an important resource in deaf education. Many short lessons or "routines" could be programmed into a storage bank and channeled to individual terminals and learning stations upon the request of the teacher. At present, the Computer Applications Branch of the Ontario Institute for Studies in Education has the facilities to record and program lessons commonly used in special

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The following comments from an address by Dr. L.D. McLean, OISE, focus on some of the implications of computers for educational administration and environmental planning:[1]

"I have spoken before about the concept we presently have of the Student-Teacher-Computer team in education. The computer will contribute its very powerful symbol manipulation capacities, its very fast information storage and retrieval capacities and both the teacher and the student will contribute their understandings of the problems at hand, and their demands for information and problem-solving. The teacher can be much more of a guide and a motivating force, and the pupil can take much more than initiative in his own education.

[1]L.D. McLean, "What Computers Can Do", an address delivered at the Canadian Education Association's 44th Conference, Regina, Saskatchewan, Sept. 27-29, 1967. Mimeographed.

"The reference escapes me, but I read somewhere the expression that the augmentation of human abilities (through computers) provides the freedom and power of disorderly processes. With each student deciding on his course of action independently and requiring information and resources different from every other student, and with teachers being free to recommend that students pursue interests as they arise, then this certainly results in a disorderly process.

"The computer, however, can keep track of all this disorder, can maintain student records and grades, administer tests, and record responses so that there is real freedom and enormous power in this disorderly process. Surely this will mean a redesign of school buildings requiring many more smaller rooms, and allowing much of the work to be done away from the school. Examinations as we know them will not be necessary since the computer will maintain up-to-date records of each student's achievement.

"Education can be goal-oriented and students can proceed as rapidly as they can accomplish the goals set for them by the educational learning specialists. Students can also pursue their own interests and set goals for themselves which can be evaluated in conference with the teachers and administrators and made a part of their own education. It is a very real question of who is going to learn more, the teachers or the students. Teaching can be much more exciting provided that teachers are willing to give up their role of being the sole dispenser of facts and the sole moderator of the learning process."

2 At present, two principal group hearing aids are used by each class of eight students and its teacher: the headphones used in the semi-circular teaching arrangement and a loop system extending over a carpeted area. On the loop system each child uses an individual aid specially tuned to the loop amplification signal. This system allows movement and free play during class.

Certain other electronic tools may become useful in aiding speech teaching programs. Visual speech systems might be helpful: "Utilizing the visible speech cathode ray tube translator, the oral response could be transformed into a graphic pattern. A graph of the correct response could be superimposed on the student's response for purposes of comparison. Different phonetic sounds could be paired with visual symbols. If the stimulus is mispronounced, the appropriate symbol would appear as a cue on the display mechanism. The learner would then pronounce the stimulus until a correct response is elicited."[1]

Lip-reading might also be aided by "an interface which could be programmed to display representative facial types pronouncing the same or different words and phrases. This would be helpful in teaching discrimination in speech-reading."[2]

In class response situations, "very often, the other members of the class either misinterpret or do not understand the response (to the teacher's question). The situation could possibly be remedied by using the graphic pattern detector . . . The student could write his response at his desk and have it appear on a screen for the cognizance of the entire class."[3]

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[1]A. Edward Black
Some Implications
(May 1965), pp. 4
[2]Ibid
[3]Ibid
[4]Berenson, *Op. C*

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All these tools exist as yet only in experimental prototypes. As the program and environment evolve, applications may become feasible.

3 Classroom furniture used in these schools can also be specifically designed to emphasize the teaching process. For instance, Berenson has suggested that the blackboard and other writing surfaces be made highly mobile and accessible from many positions.

". . . The blackboard suggested many uses not presently considered integral with its design. A blackboard on which children can draw while sitting on the floor, lying down, or standing up, and one which the teacher can use simultaneously was discussed as one relevant item, and methods for applying it to the classroom were also mentioned . . . Hardware is presently available to position this simple teaching tool in such a way that it can be used by children in any posture.

"Other transparent and translucent materials are available for use with wax composition, crayons, chalk, poster paint, or adhesive materials, to describe the work of the children."[4]

[1]A. Edward Blackhurst, "Technology in Special Education – Some Implications" *Exceptional Children,* Vol. 31, No. 9 (May 1965), pp. 449-456

[2]Ibid

[3]Ibid

[4]Berenson, *Op. Cit.*

In connection with design of furniture for classrooms, Berenson has also suggested an instruction or tutoring booth for speech instruction for one or two students and a teacher. The interior surfaces could be carpeted. In the classroom, each student could be given a special desk which could be made into a carrel by raising the removable panels on the edges of the writing surface. If raised from the floor, it would put the student's eyes on level with the teacher's face. Underneath, storage space for writing materials and projects would be available. The semi-circle could also be raised by adjustable platforms to raise the students' eye level. A platform would make it unnecessary for the teacher to be constantly kneeling to maintain the attention of the children.

Administrative-Evaluation Complex: Summary of Social Objectives

1 External relationships to centre:

- stimulate neighborhood and community involvement in centre
- provide reception facility for parents, other visitors
- house information and display gallery
- provide reception service for evaluation centre
- provide regional hearing-evaluation and counselling services

2 Internal relationships:

- encourage informal social interaction among staff
- be highly accessible to staff members, students and visitors
- promote an atmosphere of warmth and intimacy within office setting
- provide a private area for each person working in complex

3 Relationship to students:

- exhibit a range of working situations
- encourage use of speech capacities
- provide a place in which to recognize achievements in centre through public display

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Administrative-Evaluation Complex: Site Planning

This complex might include the following cluster of facilities:

- principal administrative offices and auxiliary staff offices
- reception and public exhibition gallery
- business administration offices
- office of dean of residence
- auditorium
- resource centre
- evaluation centre staff offices and facilities

Socially, these facilities would provide basic linkage between the centre and the surrounding communities. Therefore, they should be situated directly on the street and close to a parking reserve.

Scale might be comparable to that characteristic of a high-quality shopping street. Considerable variety in treatment of elevations is desirable.

A small milk store might be situated near the bus turnaround or near junior residence pavilions.

Setbacks, therefore, would in some parts of the complex be similar to those along a pedestrian mall in a shopping centre. The emphasis should be an accessibility of these facilities to passers-by. This could be implied by utilizing the street character of shopping frontages.

A reception and display gallery would draw the attention of visitors by displays concerning the centre and its work. Window space on street frontage might also be used for similar displays.

The auditorium should be utilized in the same way as an auditorium in a local elementary school. It should be readily available to non-centre groups when possible.

To emphasize scale differences between residence and school areas, there might be a two-storey elevation directly along the street frontage. A number of facilities could be placed on the second storey: business administration, clerical areas, files, storage, staff offices that do not require a great deal of visitor traffic.

Those offices where accessibility is important might be on ground level: superintendent and assistant superintendent, evaluation, dean of residence, psychologist, social workers, and so on.

Pedestrian ways could penetrate this frontage to allow access into the secondary ring of facilities: coffee house, court garden, dining and kitchen facilities, staff forum, resource centre.

The coffee house might include a court space (compare Lothian Mews, Toronto). The secondary zone pedestrian movement system might go through this space.

The public should be able to use the coffee house during the day, or early evening in spring and fall.

The milk store (or other small grocery and sundries shop) could also generate neighborhood traffic within the centre and provide incidental supplies to the children and staff in residence.

A coffee pavilion or house would provide a meeting place for students, staff, public and visitors.

It would be important that the coffee pavilion have several smaller divisions. Each of these would probably be appropriated by a particular group.

The expectation is not that the public will, as a matter of course, use this facility. Rather, it is hoped that on the occasions when members of the public visit the gallery, or for some reason happen to be in the centre on business, they might use this coffee pavilion. This possibility might further expose students to public interaction with hearing persons within the setting of the centre.

Entrance Foyer — Main Reception

Some thousands of visitors would arrive at the principal entrance of the centre each year. They could be families with pre-school children or infants seeking assessment and counselling, children just entering the centre for special education and residence, families or other adults coming to speak with administrators or to see the school, or groups (ranging from 5 to 100 persons each) coming to tour the centre.

Most of these visitors would spend some time waiting. This period could be used to acquaint them with the school and its programs. A reception gallery is suggested for this purpose. It could also serve as a public information area with material and up-to-date information regarding programs and events in the centre.

Facilities might include:

- seating areas — groups of 5 to 20 for up to 100 persons

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Facilities might include:

- seating areas – groups of 5 to 20 for up to 100 persons
- information display fixtures – automated slide (back-lit)posters and wall sequences
- printed materials
- receptionist and information counter

Dining Rooms

1 For hearing handicapped children especially, eating can be an opportunity for practising a number of social skills and providing an experience that is emotionally satisfying. Several social and psychological considerations may be specified for design of the dining facilities:

a) There should be a stable family-like table atmosphere with a specific table area or small dining room assigned to each group. It might be the cottage group, with a mixture of ages and sexes and a houseparent at each table. Chairs need not be assigned.

b) A rectangular table is no more efficient than a round or square table and has the disadvantage of giving importance to persons occupying the end chairs. Smaller tables could be clustered together.

c) A large table seating ten or more does not allow sufficient closeness for verbal exchanges among those children who can handle speech.

d) Mealtimes should be used for practising verbal skills. It is difficult to discourage the use of sign language except by providing optimum conditions for verbal conversation. This would mean that a high level of sound absorption and visual simplicity would be required in the dining area.

e) A cafeteria-type serving arrangement is economical and socially desirable. Meals served at table have some of the character of family life if done in a home-like environment. However, table service in the large mass

dining hall can be justified only if it is economical, for this single factor alone cannot induce a family atmosphere. Furthermore, very young children in normal schools seem to be able to handle a cafeteria-style serving arrangement without difficulty. An additional point in its favour is that it adds to the amount of personal responsibility for each child.

f) A variety of means may be considered for secluding each table or group of tables from the dining complex as a whole. This seclusion is considered important in order to limit background noise, encourage an intimate dining environment, and de-emphasize the large number of people eating at one time.

g) Dining groups may be arranged according to cottage groups or other socially stable groups, as long as each child can be clearly seen by an adult and there is a fairly stable social group at each table.

It is important to consider that in a cafeteria serving arrangement people will begin and finish eating at different times. This will not make the dining group unimportant. It will considerably decrease the regimented style of beginning and ending meals necessitated by a large table-service system.

h) Colour schemes and other visual designs may repeat motifs used in cottage or learning area design or may establish a visual system unique to the dining area.

2 Tables might be square or round, seating four or five persons. They must be rugged, preferably of wood. Furniture choice should be calculated to promote warmth, quiet and changeability.

The dining room might have flexible partitions, consisting of wooden uprights which can fold into the wall. These need not be soundproof; their main purpose is to cut down visual distractions among the dining areas.

Small tables might be clustered in groups of three or four. Each grouping, however, should be different. The designer might, in some fashion, key the floor through use of a chart or by actually painting different arrangements on the floor surface. This painting would be necessary in order to discourage maintenance or kitchen staff from imposing rigid geometrical order on the moveable tables. Since furniture is usually moved at least once daily in cleaning, the arrangement must be defined from the beginning by a floor design or diagram.

The designer should arrive at the design only after some discussion with and participation by houseparent groups and supervisors. This could be done shortly after the centre is opened. The initial design must allow for a floor surface that can be painted or otherwise keyed to the desired table arrangement.

It is immaterial what form table patterns take, as long as simple geometric and symmetrical room arrangements are avoided.

These suggestions may be made irrelevant by a design solution that promotes similar social objectives through different elements.

3 In addition to these social objectives, some means should be provided whereby family and teachers can eat with children in the dining facility. Since it will be

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3 In addition to these social objectives, some means should be provided whereby family and teachers can eat with children in the dining facility. Since it will be a cafeteria system, this aim should be much more easy to achieve than if table service were necessary. To take care of visitors, each dining unit should be provided with extra tables and chairs, which might be stored when not in use or simply left out for the use of children wishing to sit apart from the others from time to time.

This arrangement may present certain administrative complications. However, it is widely practised in university dining commons without problems.

Staff Commons or Forum Areas

Forums or commons areas should be located within 30-60 seconds walking distance from all staff quarters and teaching areas.

Layout might encourage social contacts between teaching and residence staff although separate facilities are needed.

The design of a staff lounge should emphasize its privacy. It will be used by certain social groups whose members may be quite unlike each other but who still regard themselves collectively as a "sub-community". There should be no formality in its furnishings. Alcoves used interchangeably by men and women should permit private chat sessions if desired.

Functional areas should be clearly indicated in the commons. Several functions should be served: kitchen, game activities (darts, card playing, table tennis) and conversation. It should be thought of as a "backstage area" where counsellors can be out of range of supervisors, visitors and children.

Note: The most successful lounge areas are often leftover and unfurnished corners in basements and back halls (especially in older buildings). A group will want to find a place where they can "get away" and will appropriate such a space, furnishing it with junk furniture and a coffee machine. The shabbiness of the place underlines its non-establishment function. In new buildings (i.e., post neo-Victorian), unfortunately, every area tends to be organized, enclosed and allocated. Alternatively, a socially adequate building will leave many "useless" but accessible corners in which random social gatherings afford an escape from the institutional life dominating planned areas of the building.

Staff rooms are required for kitchen staff, custodial staff, teaching staff and houseparents.

Athletic Buildings

The major social objective for design of the athletic complex is that it be situated so as not to dominate the campus. It is important to make the complex easily accessible from cottage areas, without placing it too close to them.

The large, blank walls characteristic of these buildings might be used as a backstop or element in the adventure and construction playgrounds described elsewhere in this study. Storage rooms for these playgrounds might be built into them. Building forms can be carefully blended with the other main complex and the site development.

The swimming pool might be a chief means of inviting persons from outside the centre to take part in the complex's activities. It should be located within easy access of the street and parking.

Social Objectives and Recommendations

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1 The residential environment must:

a) prvoide maximum opportunities for the individual child to have a range of private and community social experiences

b) offer greater environmental freedom to children who can profit from it

c) create a home-like primary social group with house-parents and students of mixed ages and sexes

d) bring children of different sexes together during the age period when they play together easily (i.e., ages 9-10)

e) permit a wide variety of play and social experiences contact and participation in street should be possible under supervision

f) permit active manipulation of environment. Internal common spaces and bedroom areas must be furnished with multi-function components which can take abuse, stacking, painting, etc.

2 Basic recommendation

A residential system should be established with three different kinds of facilities. Two (hereafter referred to as residences A and B) should be designed for the junior school program and one (residence C) for senior students who may reside in the centre in future years.

Residences A and B are two clusters of cottages connected to the main complex by a sheltered corridor or interior street. Residence A being close to the dining and learning areas, appears to be appropriate for the youngest children (ages 5-7) just entering residence school and children (ages 5-12) with multiple handicaps for whom movement is a problem.

Residence B is situated away from the main complex and fronts upon the street. It houses children, ages 8-12, in cottage units. The basic objective is to simulate a suburban-type dwelling scale, in close proximity to nearby residential areas and the street, and to maintain close access to and participation in the educational and social life in the centre.

Residence A has essentially the same objectives but must be located closer to learning areas to facilitate ease of movement to school and dining areas.

Residence C is a set of apartment units – each for four or six students – situated close to a bus stop on the campus and supervised by residence counsellors. It is expected that students would commute to satellite classes in regular senior schools in the London area. After class hours, they could join in programs in the centre's facilities as they wish.

Residential Social Relationships

For junior school students, the friends they make in residence will form an exclusive peer group throughout the educational experience.

These relationships make life at the centre a satisfying one. Houseparents report that many children would prefer to stay at the school over weekends rather than go home, where they have little ability to communicate with hearing children in their neighborhoods. However, the hearing handicapped child should return to the hearing community and use whatever oral capacities he has for at least those two days a week.

Within each cottage, the group of 12 or 16 children, the houseparents or counsellors, and their living areas should provide a measure of security and responsibility. However, residences should not aim to provide "a family". The family group should remain outside the centre where children in special educational programs have either parents or foster parents.

The centre is expected to be in operation for residential students from Sunday evening through early Saturday morning. In contrast to present practice at the Milton and Belleville schools, the program will not include weekends. Since the centre will serve London and its surrounding region, the maximum driving time for 90 percent of the population will be a little over two hours. In many cases, transportation by bus or train may have to be arranged. Although this expense would not be negligible, it is expected to be less than the cost of maintaining weekend operations in the school. The travel itself might be beneficial for students in encouraging self-reliance from an early age.

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Consideration of Residential Alternatives

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Two basic residential alternatives have been studied.

1 Family Group-home System
This system would resemble that currently used in Metro Toronto for establishing residences for disturbed children. A standard suburban or urban residential area home is leased or bought near the centre and equipped for an adult couple and seven to ten children of mixed ages and sexes. In the program for disturbed children, the couple is a man and woman, married or unmarried, trained as childcare workers.

The principal advantage of this system is duplication of many aspects of the normal family living pattern. For deaf children contact with the hearing world would be much increased. An important disadvantage is the scattering of the units, which considerably increases difficulties in ensuring security and supervision. This system might also increase parental concern, although parents of disturbed children seem to find it acceptable.

The group-home system, in spite of its socially desirable characteristics, may not be appropriate for the regional centre in London. Its chief advantage is that it simulates with some precision the family situation. The house is merely another family home on a suburban-type street. Children carry out the daily cycle of leaving for and returning from school. There are substitute parents and a mixture of ages and sexes.

If the goal of residential living in the regional centre were simulation of the family, the group-home system might be ideal. However, these aspects of deaf education and social life are also goals: preventing feelings

of social ostracization, providing an environment that compensates for hearing impairment, placing the child in close proximity to educational and social facilities available outside class hours. Traffic hazards are magnified by lack of hearing. Administrative responsibility and demands for supervision would be abruptly increased by the twice-daily travel between school and group home. Moreover, the child in residence is exposed to both his family and the demands of a hearing environment every weekend, when his family is asked to take him from the centre.

Most of the advantages of the group home can be achieved in a cottage system with easy access to surrounding residential neighborhoods. In a number of interviews, observers agreed that deaf children, when placed in situations where 50 percent or more of the children have hearing, still tend to seek playmates among each other. Given lack of speech capacities, this reluctance to fraternize outside their own group can only be expected. For the deaf child, there is already considerable stress in visiting home each weekend, since his friends are at school.

It is important to go beyond the simple stated goal that the only purpose of the teaching program for the deaf is to integrate them into the hearing community. Socially, for a majority of the adult deaf, this integration is never really accomplished. It seems realistic to expect that the centre's plan should respond to the social tendency of herding together by placing residential areas adjacent to one another, rather than scattered through the areas around the school.

The residence should be thought of as having the kinds of advantages that boarding schools traditionally are supposed to have: the opportunity to place the child in a special environment geared to teach him special skills and attitudes. This principle is not incompatible with the child's exposure to the hearing community or his eventual integration into it.

2 Cottage System

Residential groups would be housed in small individual cottages, which may be connected by corridors. Each unit is equipped with cooking facilities, has private commons areas, and apartments for houseparents. Children might be mixed in age and sex, with due regard for normal preferences and the need for privacy. Some of the day-to-day housekeeping responsibilities might be delegated to the children. Two to four children occupy one bedroom, each child, however, having a private area. The typical daily cycle of rising, preparing breakfast and going to the school area, normal in the outside community, can be duplicated in this arrangement. Lunch and dinner may be provided in dining commons in the school or within each cottage.

Considerable responsibility is given to each child in getting back and forth to the school area, looking after his own bedroom area, and taking part in group games and jobs. Older children could help the younger ones. By designing cottages of different sizes and locating them in different areas of the campus, considerable variation can be established to provide for different physical disabilities.

There is little doubt that this system is the most expensive (of the three suggested) to build, maintain and staff. However, it does afford opportunities for providing a highly diverse environment for the many

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There is little doubt that this system is the most expensive (of the three suggested) to build, maintain and staff. However, it does afford opportunities for providing a highly diverse environment for the many different individuals in a school, while fostering a home atmosphere and individual responsibility.

3 Objectives of privacy, simulation of suburban residential scale, and personal responsibility suggest that residential cottages ought to be somewhat removed from the more public and institutional areas of the teaching and evaluation facilities.

For crippled children, this separation would multiply difficulties of mobility.

From interviews with counsellors, it appears that one or two crippled children in a dormitory unit of 30 can take up a disproportionate amount of attention from the two counsellors on duty morning or evening. Complications of dressing, bathing, and movement to and from dining areas are greatly increased for such children. Caring for emotionally disturbed and retarded children may also consume a disproportionate amount of the counsellor's time.

A cluster of cottages close to the school could accommodate two categories of children for whom distance from the main complex would present difficulties:

a) children (6-12 years) with ambulatory problems who require increased attention from houseparents; children (6-12 years) with other handicaps (emotional disturbance, retardation, etc.) who require increased supervision.

b) children (6-8 years) just entering the centre.

As a consequence, a range of services and facilities, which might not otherwise be justifiable, could be

introduced for multiply handicapped children. Since the children in these units will, to some degree, share the same problems, design may take such problems into account.

Residential and Day School: Psychological Effects

A careful study has been conducted on the effects of residential attendance and day attendance on the social and language development of hearing handicapped children. Using a sample of children drawn from schools for the deaf across the U.S., Quigley and Frisina (1961) found that, in comparing statistically similar children who attended the same schools as either day or residential students, day students experienced a somewhat greater amount of emotional stress than residential students. This stress was compensated for by their superior abilities in oral communication.

It is striking to note that both types of students, day and residential, had equal attainments in vocabulary and written language development. The authors conclude that residential living does not unduly handicap the development of social and language capacities for hearing impaired children. It does protect residential students from stresses which will undoubtedly confront them when they finally leave the security of the school. Also, oral capacities develop more slowly than those of the child who returns home each day.

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Design Program of a Cottage Residential System

Within the school campus, it is suggested that three residential complexes be constructed as a system. Each of the three places greater responsibility upon the child and a relatively lighter care-taking and supervisory load upon counselling staff.

1 Residential Cottages
This is the area where all children entering at ages 5-6 will be housed, as well as children with walking difficulties. They are close to the school and dining facilities, with a counsellor on duty for every 12 children.

Each child has a bed space in a bedroom for four children, either boys or girls. A house consists of 24 children, 12 boys and 12 girls of mixed ages. It houses three counsellors, of whom two are on duty at any one time.
Units closest to the dining and class facilities could be equipped and staffed for multiply handicapped children. However, such children should not be segregated; their cottages should include children with only a hearing handicap.

2 Residential Cottages
These cottages are within five minutes' walk from the school centre. Their orientation is as much to the community around the school as it is to the school and the community centre.

Siting: Locate at a point near street activity and a short distance from main centre complex. Elevations and site relations emphasize similarity to suburban-type houses, while insuring privacy and efficient use of space. Every three units (36 children) share a large

garden and play landscape. Located within 3-5 minutes' walk of junior school classrooms and dining commons.

Cottages should be screened by earth barriers and planting from the centre complex. A closed walkway or interior street should shield the main winter path. Other unprotected walkways between centre and cottages could exploit landscape character.

Social Grouping: Sixteen children perhaps 8 boys and 8 girls to a cottage would appear ideal and different experiments could be carried out. A cluster of two cottages, an apartment for a houseparent couple, and a small apartment for a single houseparent (located between the two cottages) could be grouped around a common outdoor space. These apartments must have immediate visual and pedestrian access to the interior and exterior of both cottages. Each cluster of two cottages and apartments should have its area clearly distinguished from other areas. A larger unit for construction and site design purposes might be four cottages (64 children, 12 houseparents).

Supervision: Three houseparents for 32 children

a) a married couple in their twenties or thirties plus a younger single person, male or female
or
b) three single persons, of whom two of the same sex could share the apartment.

N.B. The apartment unit should be designed to be suitable for occupance by either a married couple or two single persons.

Two persons should be on duty at a time.

Housekeeping and Other Duties:

- Bed area maintenance
- Clothes and toy storage
- Older children should assist younger children

Cottages: Design (Standards and Layout)
Four children (of the same sex) are considered the optimal number of children per bedroom. However, other variations are acceptable, e.g. six, two, five. Three is not acceptable, as this combination may create conflict (i.e. two vs. one).

a) Bedrooms could vary as to number of beds. A few single bedrooms should be provided for older students.

b) Each child should have a personal bed area. Each of the individual light sources should be screened from adjacent bed areas.

c) Each bed area should be quite specifically differentiated from its immediate neighbors. Use of low furniture such as clothing storage units will contribute to efficient design of the area.

d) There should be a common area near the doorway of each bedroom. Furnishings should include a workbench for hobbies, personal storage areas beneath each workbench, two or three child-size chairs and a built-in sofa, also child-scaled. Lighting fixtures should be specifically chosen for each reading and work area.

e) The bedroom requires general illumination at the entrance and from the ceiling at the back.

Each unit should have its own system of forms, colours and textures.

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Each unit should have its own system of forms, colours and textures.

Each child should have a personal area which, at the minimum, includes bed space, dressing area, storage space for clothing and personal effects and a small table with light, useful for quiet work and as a dressing table.

a) It would be desirable to establish a pattern whereby each bed area within a bedroom would be a different colour. If an economical means of changing colour according to the preference of each child can be found, this would further enhance personal identification with the bed area.

b) Each bed area must be clearly visible from the doorway of the room so that counsellors on night duty can make bed checks efficiently.

c) When standing, the child should be able to see into other bed areas. When lying down, other bed areas should be out of his range of vision.

d) Clothing storage units should be designed so that a 5-to-6-year-old can readily reach the uppermost shelves. Drawer catches should be placed on each drawer to prevent accidental spills.

e) The use of clothing storage units as defining elements for each bed area may prove desirable.

3 Residential Apartments
Assuming normal social maturation, older students during their final two years in residence could be placed in apartments located on the edge of the campus and directly adjacent to transit connections, from which they could commute to comprehensive high school facilities in the London area. The majority of evening meals could be taken in centre dining facilities; breakfast could be prepared in each apartment.

Siting:

- Edge of campus within texture of street frontage typical of area
- Elevations conform to street vernacular
- Small lighted open space as a setback at base of building
- Within 30 minutes of high school by transit (or taxi)
- Within 5 minutes' walk of centre.

Social Grouping:

- Ages: 16-18 and over
- Sex: integrated, with separate segregated wings (or floors) for sleeping quarters. Connecting area must be under observation at all times, with lock and key control
- Basic unit is two students per bedroom
- 5-8 bedrooms per lounge (with kitchenette), 2 baths and one shower for 4-6 bedrooms.

Supervision:

- Residence counsellors, one for 10-15 students

Housekeeping:

- Maintenance of bedroom areas
- Some or all cooking facilities in each apartment.